



148

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## SEQUENCE LISTING

<110> NELSON, DAVID R.

<120> A LIVE, AVIRULENT STRAIN OF *V. ANGUILLARUM* THAT PROTECTS FISH AGAINST INFECTION BY VIRULENT *V. ANGUILLARUM*

<130> 5112

<140> 09/915,706

<141> 2001-07-26

<160> 4

<170> PatentIn Ver. 2.1

<210> 1

<211> 3588

<212> DNA

<213> *Vibrio anguillarum*

<220>

<221> modified base

<222> (3572)

<223> a, t, c, q, other or unknown

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Arg Pro Leu Arg Asn Glu Phe Asn Val Ala Gln Thr Ala Leu Arg Lys  
 35 40 45

Leu Ser Gln Asn Pro Ser Ala Asp Glu Arg Asp Ala Leu Gln Glu Ala  
 50 55 60

Cys Leu Asn Lys Trp Lys Ile Leu Ser Asp Ser Leu Tyr Glu Gln Phe  
 65 70 75 80

Ser Lys Thr Thr Arg Asp Ile Glu Leu Ile Ser Trp Phe Val Ala Ala  
 85 90 95

Gln Phe Leu Leu Asp Thr Thr Leu Glu Ser Ala Ala Asn Ser Leu Glu  
 100 105 110

Trp Leu Ala Asp Leu Ser Glu Lys His Trp Asp His Leu Asn Pro Val  
115 120 125

Leu Pro Val Glu Thr Leu Lys Ser Asp Asp Asp Lys Gly Lys Glu Arg  
130 135 140

Glu Gln Ala Asp Ala Lys Val Lys Ala Phe Phe Gln Leu Val Gly Asp  
145 150 155 160

Ser Glu Glu Ser Ser Ile Leu Tyr Ala Pro Val Leu Gln Leu Pro Leu  
165 170 175

Val Gly Glu Val Thr Phe Phe Asp Phe Gln Ser Ala Glu Arg Lys Gly  
180 185 190

Glu Ile Ser Gln Leu Lys Ser Met Leu Thr Thr Thr Val Ala Gln Glu  
195 200 205

Arg Phe Ala Ile Gln Phe Lys Met Glu Asn Ala Lys Arg Cys Val Thr  
210 215 220

Gln Leu Asp Arg Leu Ser Ala Leu Val Ser Thr Lys Cys His Ser Leu  
225 230 235 240

Gly Ser Gln Ser Thr Asn Phe Gly Phe Ala Lys Ser Leu Leu Thr Arg  
245 250 255

Val Glu Asn Ala Leu Val His Leu Ser Gly Ile Lys Leu Ala Pro Lys  
260 265 270

Ala Glu Ala Lys Thr Val Glu Gln Glu Val Ala Glu Ser Ser Val Ser  
275 280 285

Glu Gly Glu Leu Pro Ser His Met Asp Thr Lys His Ile Glu Arg Ile  
290 295 300

Pro Met Ala Ser Glu Gln Ala Gln Thr Val Ser Gln His Leu His Ala  
305 310 315 320

Gly Asn Leu Ser Glu Leu Gly Asn Leu Asn Asn Met Asn Arg Asp Leu  
325 330 335

Ala Phe His Leu Leu Arg Glu Val Ser Asp Tyr Phe Arg Gln Ser Glu  
340 345 350

Pro His Ser Pro Ile Ser Phe Leu Leu Glu Lys Ala Ile Arg Trp Gly  
355 360 365

Tyr Leu Ser Leu Pro Glu Leu Leu Arg Glu Met Met Ser Glu Gln Asn  
370 375 380

Gly Asp Ala Leu Ser Thr Ile Phe Asn Ala Ala Gly Leu Asn His Leu  
385 390 395 400

Asp Gln Val Leu Leu Pro Glu Val Ser Thr Pro Thr Val Gly Ile Glu  
405 410 415

Ser Pro Gln Thr Pro Gln Ala Lys Pro Ser Val Ser Asp Pro Arg Ser  
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Val Glu Glu His Val Ser Gln Thr Ser Pro Val Asp Thr Gln Ser Lys  
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 35 40 45

Asp Ile Gly Asn Gly Thr Asn Ala Asp Ser Gly Met Val Gly Val Ser  
 50 55 60

Glu Val Ser Val Thr Lys Glu Val Asp Gly Ala Ser Glu Asp Leu Leu  
 65 70 75 80

Ser Tyr Leu Phe Asn Pro Gly Lys Asp Gly Lys Thr Val Glu Val Ala  
 85 90 95

Phe Thr Lys Pro Ser Asn Asp Gly Gln Gly Ala Asp Val Tyr Phe Gln  
 100 105 110

Val Lys Leu Glu Lys Ala Arg Leu Val Ser Tyr Asn Val Ser Gly Thr  
 115 120 125

Asp Gly Ser Gln Pro Tyr Glu Ser Leu Ser Leu Ser Tyr Thr Ser Ile  
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Pro Phe Val Val Gly Val Ile Gly Asp Phe Ser Gly His Lys Pro Glu  
35 40 45  
Ser Glu Lys Val Asp Leu Glu Glu Arg Glu Phe Thr Gly Ile Asp Lys  
50 55 60  
Asp Asn Phe Asp Thr Val Met Gly Gln Ile His Pro Arg Leu Ser Tyr  
65 70 75 80  
Lys Val Asp Asn Lys Leu Ala Asn Asp Asp Ser Gln Phe Glu Val Asn  
85 90 95  
Leu Ser Leu Arg Ser Met Lys Asp Phe His Pro Glu Asn Leu Val Asp  
100 105 110  
Xaa Ile Glu Pro Leu  
115